

CLAIMS

- 1 1. A method for providing an enhanced level of indirection with respect to a resource
2 attached to a destination, the method comprising the steps of:
3 comparing a content of a widelink directive with first parts of widelink entries
4 stored in a translation table of a first storage system, the widelink directive generated and
5 sent by a client to the first storage system within a first request to access the resource;
6 substituting the content of the widelink directive with a second part of a matching
7 widelink entry indicating a correct path to the destination; and
8 establishing a connection from the client to the destination over the correct path to
9 thereby provide the enhanced level of direction that enables access by the client to the
10 requested resource.

- 1 2. The method of Claim 1 further comprising the steps of, prior to the step of substitut-
2 ing:
3 returning an error status to the client; and
4 in response to the error status, sending a second request from the client to the first
5 storage system for a referral to a correct location of the resource.

- 1 3. The method of Claim 2 wherein the referral is a distributed file system (DFS) referral.

- 1 4. The method of Claim 3 wherein the client is a DFS-enabled common internet file
2 system (CIFS) client.

- 1 5. The method of Claim 4 wherein the first storage system is a first filer.

- 1 6. The method of Claim 5 wherein the destination is a CIFS share including one of a
2 second filer, a second storage system and a Windows server.

1 7. A memory of a first storage system containing data structures comprising:

2 a widelink directive generated by a first computer and sent to the first storage system
3 for storage in the memory, the widelink directive having a content defined as an original
4 path descriptor to a resource; and

5 a widelink entry structure adapted for storage in a symlink.translation table of the
6 memory, the widelink entry structure having a multiple-part format, wherein a first part of
7 the widelink entry is compared with the content of the widelink directive and, if a match is
8 found, the content of the directive is substituted with a second part of the widelink to enable
9 access to the resource on a second storage system.

1 8. The memory of Claim 7 wherein the first storage system is a first virtual filer (vfiler) of a
2 filer and the second storage system is a second vfiler of the filer.

3 9. The memory of Claim 7 wherein the first storage system is a first protocol server of a
4 multi-protocol filer and second storage system is a second protocol server of the multi-
5 protocol filer.

6 10. The memory of Claim 9 wherein the resource is a unit of storage.

7 11. The memory of Claim 10 wherein the first computer is a common internet file system
8 (CIFS) client computer and wherein the unit of storage is a CIFS share.

9 12. The memory of Claim 7 wherein the first storage system is a first filer and wherein the
10 second storage system is a second filer.

11 13. The memory of Claim 12 wherein the resource is a unit of storage.

12 14. The memory of Claim 13 wherein the first computer is a common internet file system
13 (CIFS) client computer and wherein the unit of storage is a CIFS share.

1 15. The memory of Claim 7 wherein the multiple-part format of the widelink entry
2 structure includes a third, optional part that ensures unique identification of the resource

1 16. The memory of Claim 15 wherein the third optional part comprises an @ symbol
2 signifying a qtree identifier.

1 17. A filer adapted to provide an enhanced level of indirection with respect to a resource
2 attached to a remotely configured destination, the filer comprising:

3 a memory organized as storage locations to store data structures, including a
4 translation table having a plurality of entries;

5 an operating system resident in the memory, the operating system including spe-
6 cial code configured to access the translation table in response to a widelink directive to
7 compare a content of the widelink directive with the entries of the table, the special code
8 further configured to provide a correct path to the resource attached to the remotely con-
9 figured destination in response to the content of the widelink directive matching a wide-
10 link entry of the translation table.

1 18. The filer of Claim 17 further comprising a processing element configured to execute
2 the operating system to thereby invoke network and storage access operations in response
3 to processing of the widelink directive and the matching widelink entry.

1 19. The filer of Claim 18 wherein the remotely configured destination is a common
2 internet file system (CIFS) share including one of a second filer, a multi-protocol storage
3 system and a Windows server.

1 20. Apparatus for providing an enhanced level of indirection with respect to a resource
2 attached to a destination, the apparatus comprising:

3 means for comparing a content of a widelink directive with first parts of widelink
4 entries stored in a translation table of a storage system, the widelink directive generated
5 and sent by a client to the storage system within a first request to access the resource;

6 if a match is found, means for returning an error message to the client;
 7 in response to the error message, means for sending a second request from the cli-
 8 ent to the storage system for a referral to a correct location of the resource;
 9 in response to the second referral request, means for substituting the content of the
 10 widelink directive with a second part of the matching widelink entry indicating a correct
 11 path to the destination; and
 12 means for establishing a connection from the client to the destination over the cor-
 13 rect path to thereby provide the enhanced level of direction that enables access by the cli-
 14 ent to the requested resource.

1 21. The apparatus of Claim 20 wherein the destination is remotely configured with re-
 2 spect to the storage system.

1 22. The apparatus of Claim 21 wherein the remotely configured destination is a common
 2 internet file system (CIFS) share including one of a multi-protocol filer, another storage
 3 system and a Windows server.

1 23. A computer readable medium containing executable program instructions for pro-
 2 viding an enhanced level of indirection with respect to a resource attached to a destina-
 3 tion, the executable program instructions comprising program instructions for:
 4 comparing a content of a widelink directive with first parts of widelink entries
 5 stored in a translation table of a storage system, the widelink directive generated and sent
 6 by a client to the storage system within a first request to access the resource;
 7 if a match is found, returning an error message to the client;
 8 in response to the error message, sending a second request from the client to the
 9 storage system for a referral to a correct location of the resource;
 10 in response to the second referral request, substituting the content of the widelink
 11 directive with a second part of the matching widelink entry indicating a correct path to
 12 the destination; and

1 24. The computer readable medium of Claim 23 wherein the destination is remotely con-
2 figured with respect to the storage system.

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